

SEED PREDATION BY A BRACONID WASP,  
*ALLORHOGAS* SP. (HYMENOPTERA)

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*Abstract.*—We record the first case of phytophagy among the Braconidae. The larvae of an unidentified species of *Allorhogas* have been observed feeding on *Pithecellobium tortum* (Leguminosae) seeds in restinga of Barra de Maricá, Rio de Janeiro, Brazil. Ecological and biological aspects of the species are described.

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In a study of seed predation of a leguminous plant, *Pithecellobium tortum*, Martius, we observed a braconid wasp, *Allorhogas* sp., feeding on immature seeds. This genus belongs in the Doryctinae, an ectoparasitoid subfamily in the Braconidae, which usually attack wood-boring and bark-mining Coleoptera larvae (Capek, 1970).

The phytophagous habit was not recognized at first because the literature considers all the Braconidae to be parasites or hyperparasites upon other insects (Matthews, 1974). Despite the fact that the Ichneumonoidea have been studied for a long time only 10 to 20% of the described species have their hosts recorded (Iwata, 1976). Thus it is reasonable to expect that the number of known cases of phytophagy in the Braconidae may increase with more studies on the biology of this group.

METHODS

Samples of fifteen fruits were collected biweekly from February to June 1986 from each of seven *P. tortum* plants, a spreading shrub up to three meters in height. The study was conducted in the restinga (coastal scrub) of Barra de Maricá in the city of Maricá, Rio de Janeiro, Brazil (22°57'S, 42°50'W).

About 200 fruits at varying stages of maturation were collected from various individuals and dissected under magnifying lenses to observe larval behavior.

RESULTS

The following insects emerged from fruits of *P. tortum*: *Allorhogas* sp. (Braconidae), *Eurytoma* sp. (Eurytomidae), *Merobruchus boucheri* Kingsolver (Bruchidae) and *Eupelmus amicus* Girault (Eupelmidae). Emergence occurred in two different intervals. When fruits were immature, only braconids and eurytomids emerged. When fruits were ripe, bruchids and eupelmids emerged. The sequential emergence of these two groups had a slight overlap due to a time lag in the fruiting period of plants and in the development of fruits from the same plant (Fig. 1). It is noteworthy that bruchid eggs, which are laid on the pod surface, were only found on well developed fruits, after the emergence of *Allorhogas* and *Eurytoma*.

As *Allorhogas* sp. and *Eurytoma* sp. are found simultaneously in the fruits of *P. tortum*, it was necessary to distinguish between their immature forms. The description

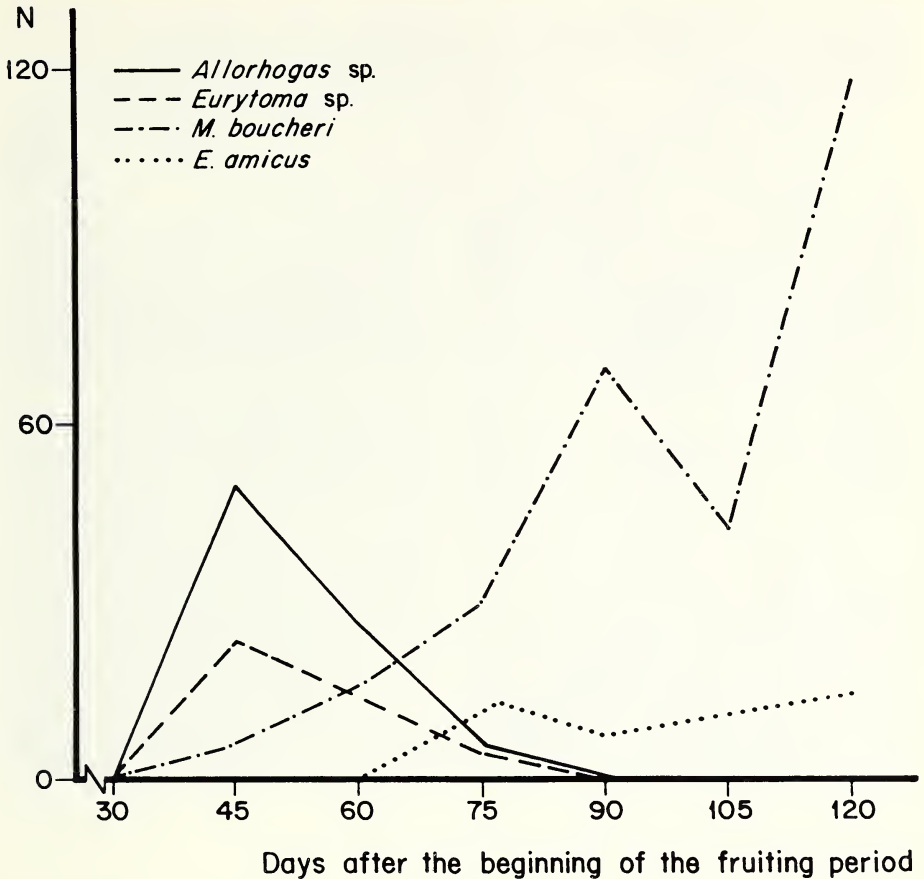


Fig. 1. Time variation of insect species obtained from *P. tortum* fruits each biweekly sample consisted of 105 fruits from seven trees.

of the two different larvae and the obtention of adults from these described forms showed that the braconid larvae have sclerotized cephalic structures about the mouthparts while the eurytomid larvae lack these structures. It was thus possible to identify the larvae easily, in the lab, even when they were newly hatched.

In the laboratory we verified that all attacked immature seeds had the same kind of damage, which suggested that there was only one phytophagous species. This was confirmed by direct observations of *Eurytoma* larvae externally parasitizing braconid pupae (Fig. 2). The larva consumes its host within three days and pupates in the following day. This observation, however, served only to prove that *Eurytoma* could parasitize the braconid pupae, but did not prove that *Allorhogas* was phytophagous.

In July 1988 we observed that almost all of fifty sampled *P. tortum* fruits from the restinga of Barra de Maricá, neither *Allorhogas* nor *Eurytoma* were found. Thirty young fruits were collected and exposed to *Allorhogas* adult females reared from *P.*

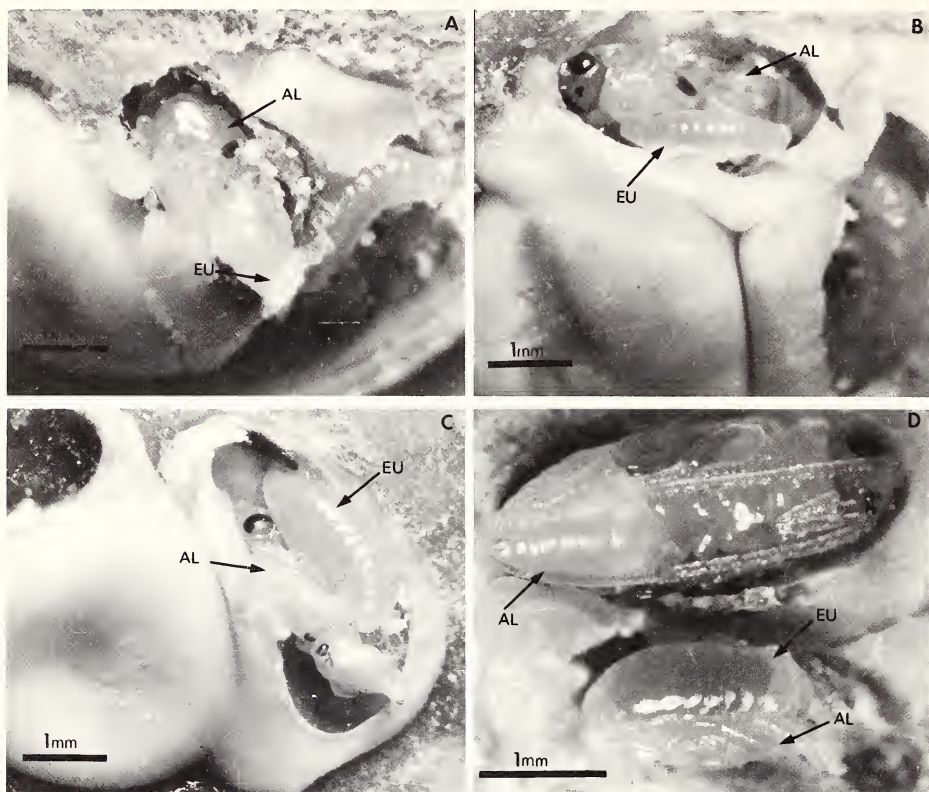


Fig. 2. Sequence of development of the parasite larva, *Eurytoma* sp. (EU), on its host, *Allorhogas* sp. pupa (AL). Note the division on the seed—C.

*tortum* seeds from another region (restinga of Arraial do Cabo, RJ, about 70 km from Maricá). Two weeks later we dissected the fruits and found only *Allorhogas* larvae in the great majority of the seeds.

BIOLOGY OF *ALLORHOGAS* SP.

We observed larvae of *allorhogas* at different stages of development. Oviposition occurs on young, full-length fruits which thicken considerably before maturation. At this stage the seed is still small; it has a soft coat and a large amount of endosperm, but its embryo is as yet poorly developed.

At the beginning of its development the braconid larva induces a division in the seed in which it is located and stays in one of the two parts (Fig. 2C). We noticed that even when a seed is attacked by two or more larvae, the divisions occur in such a way that there always is an undamaged region. In 98% of cases (N = 150) the embryo is found in this undamaged region.

Initially, the larva feeds on endosperm, and later on the seed coat. The larva never attacks the embryo or the funicle.

Close to pupation the larva spins a silk cocoon around itself. The newly formed pupa is yellow; later on, the eyes, antennae, and some regions of the thorax and abdomen become darker. Development is completed in 20 days. The adult chews a hole in the fruit with its mandibles and emerges.

#### DISCUSSION

According to Marsh (1979) host records indicate that some *Allorhogas* species are associated with gall making insects, especially cynipids. However, Marsh states that there is no confirmation that these species are parasites of the gall makers and that they are probably parasites on other insects.

Guimarães (1957, unpublished thesis) obtained a different undescribed species of *Allorhogas* (cited as *A. muesebecki* Guimarães, 1957) from galls in *Anemopaegma mirandum* Alph. DC. (Bignoniaceae). Since this species was the only one to emerge from the galls studied, he concluded that the galls were induced by the braconid.

Whitehead (1975) obtained a species of *Allorhogas* from fruits of *Lysiloma* and *Albizzia* (Leguminosae: Mimosoideae) and stated that the species could be a specialist parasite on *Merobruchus*, a bruchid obtained from the same fruits. By comparing the systems observed by Whitehead in *Lysiloma* and *Albizzia* with the one in *P. tortum* we find a clear similarity. It may thus be possible that the *Allorhogas* species found by Whitehead is also phytophagous.

Extensive ecological and taxonomic studies on *Allorhogas* are of high interest. These will improve our understanding of the biology and ecology of the Braconidae.

As to the *Eurytoma* species found, the fact that its larvae were observed feeding on small larvae of *Allorhogas* sp., which are certainly not sufficient for their complete larval development, leaves open the possibility that the larvae complement their diet with plant tissue. Such an observation was made by Phillips (1927) for *Eurytoma parva* (Girault).

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